



## DRI ANNUAL REPORT

*Fiscal Year 2006*



### *About the cover*

Distinguished service of DRI faculty and staff—15 years or more—is recognized on the cover of the Fiscal Year 2006 Annual Report. The back cover identifies these outstanding people and provides their DRI affiliations and their years of service to the institute.

### *Not pictured on cover*

**Dr. Lonnie Pippin**, 28 years, Research Professor  
**Bradley “Brad” Lyles**, 22 years, Associate Research Hydrogeologist  
**Craig Shadel**, 22 years, Assistant Research Geochemist  
**Thomas “Tom” Swafford**, 21 years, Principal Research Technologist  
**Dr. Melanie Wetzel**, 19 years, Associate Research Professor  
**Ronald “Randy” Nicholson**, 18 years, Assistant Research Hydrogeologist  
**Harold Drollinger**, 15 years, Associate Research Archaeologist  
**Robert Jones**, 15 years, Associate Research Archaeologist

## Dear Friends:

Welcome to DRI's Fiscal Year 2006 (FY 2006) Annual Report. As always, it is my pleasure to share some of the highlights of the past year with you. I will focus on the broader picture, and I have invited our three division executive directors, Dr. Michael Auerbach (Division of Earth and Ecosystem Sciences), Dr. Kent Hoekman (Division of Atmospheric Sciences), and Dr. John Warwick (Division of Hydrologic Sciences) to tell you more about their divisions and highlight some of their programs currently underway.

Overall, DRI continues to be guided by a vision and mission that harken back to the words used by the Nevada Legislature in establishing DRI nearly 50 years ago (1959): "To contribute more effectively to the security of the nation and to promote the general welfare of the State of Nevada and its citizens through the development of educational and scientific research. . ."

Given this overarching mandate, DRI is living up to its reputation by being "Nevada's Global Laboratory," enhancing and expanding institutional goals to help improve lives in Nevada, the nation, and the world through scientific solutions (see pages 4 and 5). Three of our core goals are described in the following paragraphs.

*Serving as a world leader in environmental sciences through the application of knowledge and technologies to improve the quality of human life worldwide.* DRI is accomplishing this goal by establishing active partnerships and collaborations with communities, organizations, businesses, governments, and international entities to address the most crucial environmental issues and needs identified at the state, national, and international levels.

Senator William Raggio was honored with the DRI President's Medal at the 2006 Reno Nevada Medal Dinner for his commitment to education in Nevada and his advocacy of DRI.



*Fostering scientific talent for the advancement of environmental sciences and integration of disciplinary sciences to provide innovative interdisciplinary solutions and enhanced resource management.* DRI is accomplishing this goal by providing the highest quality opportunities for post-doctoral, graduate, and undergraduate research experiences; adding value to Nevada's teaching institutions by encouraging participation in graduate and undergraduate programs; and supporting science education throughout the state.

*Leveraging scientific innovation and intellectual capital to meet Nevada's needs for economic diversification, growth, and global recognition.*

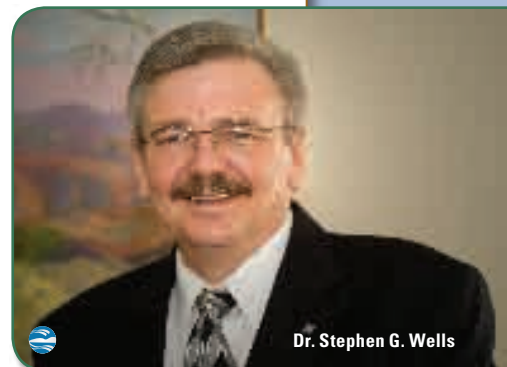
DRI is a model for demonstrating how entrepreneurialism in scientific research strengthens a university system, a state's economic portfolio, a nation's security, and society overall.

How did DRI measure up in FY 2006? You can be the judge as I enumerate just a few of the ways DRI has been at the forefront in numerous research areas thanks to the work of our faculty, staff, students, administration, and the DRI Research Foundation.

Several key attributes distinguish DRI within the Nevada System of Higher Education (NSHE), including the fact that DRI faculty members do not receive tenure or state salary support. Instead, they are responsible for generating their own salaries through their entrepreneurial spirit and timely delivery of useful products. Despite their demanding work requirements, our faculty members still find time to participate in, and even lead, graduate programs in hydrologic sciences and atmospheric sciences. In fact, each year DRI supports approximately 60 graduate students in these and other programs at the University of Nevada, Reno, and the University of Nevada, Las Vegas (UNR and UNLV).

It is through the dedicated efforts of the entrepreneurial faculty and staff of DRI that the institution thrives. Here are just a few examples.

Over the past several years, DRI has leveraged \$60 million in state support to bring \$227 million in research funding to Nevada, and these research dollars have produced an economic impact in the state of approximately \$545 million.



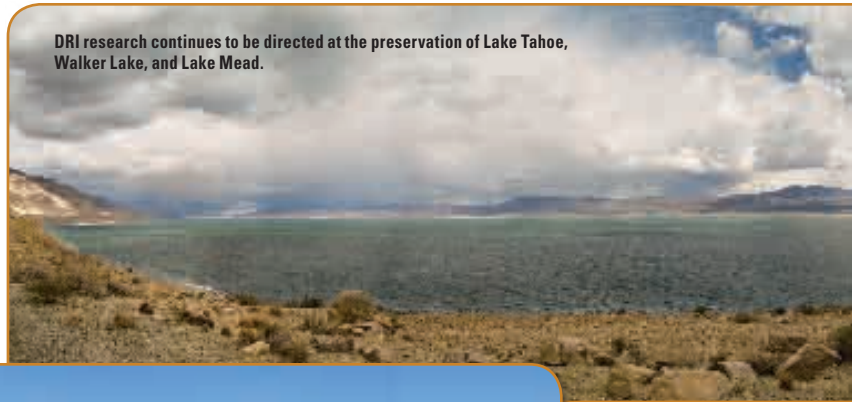
Dr. Stephen G. Wells



Over this same period, DRI's total annual revenue has increased 85 percent to \$50 million, yet DRI uses approximately only one percent of Nevada's higher education budget.

DRI's goal to hire and foster the best scientific talent has yielded a 76 percent increase in competitive funds brought into Nevada by the institute over the past several years. Examples of this growth in

DRI research continues to be directed at the preservation of Lake Tahoe, Walker Lake, and Lake Mead.



Lake Mead



Lake Tahoe

DRI's competitive research portfolio are indicated by a 90 percent increase in funding from the National Science Foundation, 111 percent increase in funding from the U.S. Department of Defense, and 30 percent increase in funding from the U.S. Department of Energy.

DRI research efforts have spanned the globe including projects like monitoring air-quality conditions at ground zero in the aftermath of 9/11; playing a lead role in defining the impacts of climate change and industrial pollution on sensitive polar environments; applying innovative technology to support military operations in the

Iraq conflict; collaborating with the Chinese to help preserve their national treasures; and partnering with other entities in West Africa to bring safe, sanitary, and reliable water resources to rural communities.

DRI is meeting the challenge of pressing environmental problems ranging from local to global settings by establishing broader interdisciplinary approaches and institution-wide integrated science centers. The newest integrated science center, the Center for Advanced

Visualization, Computation, and Modeling (CAVCaM), has been supported by approximately \$13 million in programmatic research and will yield research and technological advancements through the world of virtual reality. DRI's integrated science centers also have helped Nevadans through enhanced air-quality monitoring of broad areas surrounding the Nevada Test Site, as well as enhanced research directed at the preservation of Lake Tahoe, Walker Lake, and Lake Mead.

Working inside the CAVE virtual environment, the cornerstone of the CAVCaM visualizations displays.





Walker Lake



To support programmatic growth, we have completed the DRI Facilities Master Plan, which defines the growth of DRI's campuses over the next 20 years. Several accomplishments in this arena include securing state and private financing for completion of the Frank H. Rogers Science and Technology Building in Las Vegas;

obtaining state, private, and institutional support for the Maxey Science Center addition and remodeling project, as well as the field operations building; obtaining state and federal funding for the Computational Research and Visualization Building; and investing institutional and private funds in remodeling and optimizing facilities to accommodate rapid expansion in supercomputing and networking requirements.

I am also pleased to report that a clear title to the Dandini Research Park was obtained when the Dandini land conveyance bill (HR 542) was passed by the U.S. House of Representatives and signed into law by President Bush. With this action, transfer of title from the U.S. Department of the Interior to NSHE was completed thus enhancing our capability to leverage DRI and its partner, Research Parks Ltd., to develop the research park as an "incubator" for start-up, high-tech companies.

Further, related to high-tech enterprises, the establishment of the UNR-DRI Technology Transfer Office—which provides support for research faculty pursuing intellectual property protection and licensing—has aided DRI in securing 18 invention disclosures and 13 patents issued during the past several years.

In addition, I would like to note that DRI's outreach initiatives have tackled the challenge of creating a more diverse environment at DRI, resulting in visits from representatives of both historically black colleges and universities and minority-serving institutes (MSI). DRI's participation in the third national MSI Research Partnerships Conference and the signing of a Memorandum of Understanding between Tennessee State University's President, Dr. Melvin N. Johnson, and me has

helped us establish powerful research partnerships for DRI faculty and students.

The DRI Annual Report gives me an excellent forum to thank all of DRI's sponsors and donors, as well as key people and groups who have worked to help DRI achieve this remarkable record of success.

We are grateful to the members of the Nevada delegation—Senator Harry Reid, Senator John Ensign, Congressman (now Governor) Jim Gibbons, Congresswoman Shelley Berkley, and Congressman Jon Porter—for their assistance in enhancing DRI's research competitiveness.

As we begin site preparation for our new Computational Research and Visualization Building, I would like to again thank the members of the Nevada State Legislature for the funds that are making the building a reality.

Governor Kenny Guinn and First Lady Dema Guinn in 2006 again lent their support to DRI's annual Nevada Medal Dinners resulting in the most successful events to date in terms of both fundraising and "friendraising."

The members of the NSHE Board of Regents and Chancellor James E. Rogers continued to provide vital support to DRI's efforts to enhance research in and for the state of Nevada.

All of us at DRI are indebted to Chairman Kenneth Ladd and the trustees of the DRI Research Foundation, leaders in Nevada and the nation, who work tirelessly on behalf of the institute.

Finally, I would like to thank the faculty and staff of DRI for being the heart of the institute and the source of its success.

Now please read on to learn more from our division executive directors about some of DRI's outstanding scientific and research projects and programs.

Cordially,

Dr. Stephen G. Wells  
*President*

For additional information about DRI, please refer to the web site at [www.dri.edu](http://www.dri.edu)

**Nevada, the Nation and the World: *How does the environment affect the spread of disease?***

Disease is a major issue for the world's citizens on every continent. Closer to home, DRI's Dr. Ken McGwire and a team of scientists from DRI and the University of Nevada, Reno have been working to understand how the environment affects the



spread of disease from animals to humans, primarily the Sin Nombre Virus (the agent or cause of the hantavirus, which is rare but deadly). Using remote sensing and global positioning devices to track infected deer mice, one of the worst culprits of spreading the disease, has led to the conclusion that elevations of land and types of vegetation affect the prevalence of the disease. These results can be used to recommend that people keep out of harm's way.

**Nevada: *Wouldn't it be nice if you never had to smog your car again?***

The Vehicle Emission Remote Sensing Systems (VERSS), developed and patented by DRI faculty, is a remote-sensing technology measuring pollutant emissions by vehicles as they drive by the VERSS. One VERSS application is drive-by emission inspection (i.e., smog-check). The VERSS pictured here measures the amounts of several pollutants (particulate matter, carbon monoxide, nitric oxide, and hydrocarbons) emitted by individual vehicles. Results showed that the dirtiest 10% of vehicles included in the trials were responsible for about 80% of total emissions.



**The World: *Can a unique national treasure be saved with applied technology?***

Terra-cotta soldiers from the Qin Dynasty in Xi'an, China, are considered a national treasure. But since they have been unearthed, they have begun to degrade due to unknown constituents in the air. DRI's Dr. Judy Chow and Dr. John Watson have collaborated with scientists from the Chinese Academy of Science and Hong Kong Polytechnic University to conduct air quality research to preserve the terra-cotta soldiers. Scientists approach air sampling in two ways: actively by pulling air through filters and passively by using a silicon wafer to absorb gases from the ambient air (as seen in photo).



**The World: *Can global changes be tracked through the environment?***

Ice cores from Greenland and Antarctica are particularly good at showing global changes over time because snow, when it falls, deposits with it particles from the air and snow in very cold areas never melts. Therefore, snow pack holds the key to unlocking the Earth's historical climate conditions. The study of ice cores from these places can give DRI's scientists a first-hand look at the types of elements present in our world's history. Dr. Joe McConnell, the 2006 recipient of the Nevada System of Higher Education's Researcher of the Year Award, is the lead scientist in this fact-finding mission.



# DRI: Nevada's Global Laboratory

## Answering Environmental Questions for Nevada, the Nation, and the World





**The Nation:** *How do weather forecasters make predictions?*

From national disasters like Hurricane Katrina, to forest fires all over the western states, weather can wreak havoc on our lives. DRI is home to the Western Regional Climate Center (WRCC), one of only six regional centers for climate data in the United States. Not only can the weatherman check out weather conditions all over the western United States, but so can anyone with Internet access. It's all available on the web site, located at [www.wrcc.dri.edu](http://www.wrcc.dri.edu). Since 1986, members of DRI's Division of Atmospheric Sciences have been monitoring changes in climate, including extremes found in drought and flooding conditions. DRI's researchers, using WRCC data, were asked to participate in studies of the environmental hazards in New York City following the September 11 collapse of the World Trade Center towers.

**The World:** *How does the world get clean water?*

In the United States, we have the luxury of clean water every day. But in many parts of the world, that luxury is only a dream. DRI is part of an exemplary and far-reaching international effort—the West Africa Water Initiative (WAWI)—designed to bring potable water to the countries of Ghana, Mali, and Niger. Through WAWI, a public-private partnership envisioned by the Conrad N. Hilton Foundation, DRI researchers are employing advanced technologies for regional groundwater exploration and improved access to safe drinking water for rural villagers. Without potable water, up to 50 percent of children under the age of five die of water-borne diseases and the older population is affected by Guinea worm and trachoma. Begun in 1984, the program has provided clean water and sanitation services in Ghana (pictured here) as the entry point for community development, supplying water to more than 500,000 people. Through WAWI, access to clean water now is being expanded to Ghana's neighbors, Mali and Niger.



**Nevada, the Nation and the World:** *How can the health of U.S. soldiers in the Middle East be better protected?*

One of DRI's more recent projects is working toward protecting American soldiers in the Middle East from inhaling unhealthy levels of toxic metals and other elements in the air. Beginning in December 2005, the U.S. Department of Defense approached DRI to coordinate and manage a project designed to sample and analyze the ambient air quality at 15 U.S. military sites throughout the Middle East. Aerosol filter samples are being collected every sixth day at each site to be chemically and mineralogically analyzed by DRI and its subcontractors. When this project is completed, DRI will present the results with recommendations to the U.S. Army's Center for Health Promotion and Preventive Medicine.



## Dear Colleagues and Friends:

The Division of Atmospheric Sciences (DAS) within DRI is engaged in a wide variety of fundamental and applied research activities principally involving climate, atmospheric processes, and regional/local air quality. This work is conducted around the world in response to the needs of public and private organizations.

The division is composed of approximately 55 research faculty, along with about 25 technologists, 30 graduate students, eight post-doctoral students, and associated support staff. Four DAS faculty members are located in Las Vegas, two are in Steamboat Springs, Colorado, with the remainder being located in Reno. Total annual research expenditures for the division are approximately \$14 million.

DAS research capabilities in atmospheric science include the chemistry/physics of clouds and aerosols, precipitation processes, meteorology, climatology, weather modification, and others. Capabilities in air quality include emissions source characterization, air pollutant transport, ambient pollutant measurements, visibility, and source attribution techniques. In addition, DAS faculty are involved in the development and application of new instrumental techniques, and have extensive capabilities in numerical modeling of atmospheric and air pollution processes.

### RESEARCH HIGHLIGHTS FOR FISCAL YEAR 2006

At any given time, DAS faculty are involved in over 100 research projects. To illustrate some recent scientific accomplishments within the division, I'd like to highlight three specific project areas: T-REX; smog chemistry; and our work with the Chinese terra-cotta figures.

T-REX is a shortened name for the Terrain-induced Rotor Experiment. An atmospheric rotor is a turbulent, horizontal whirlwind of air that appears on the lee side of mountains under certain strong wind conditions. These rotors, which represent a significant aviation hazard, frequently occur in the Owens Valley area of California. Today, atmospheric science and research

aviation have advanced to a point where investigators are able to carefully study rotors and other turbulence associated with mountain-induced waves.

DAS Associate Research Professor Dr. Vanda Grubišić is leading a large team of multi-disciplinary scientists, technicians, and students from DRI, the National Center for Atmospheric Research and several universities from the U.S. and abroad. A major field measurement campaign was conducted in the Owens Valley area during spring 2006. Numerous ground-based and aircraft measurements were conducted to better understand the structure and evolution of atmospheric rotors and related phenomena in complex terrain. Included in this effort was use of the new National Science Foundation's Gulfstream V aircraft called HIAPER (High-performance Instrumented Airborne Platform for Environmental Research). The T-REX project is now in a data analysis phase. The project participants are hopeful that T-REX will help solve

the mystery of motion within rotor clouds and improve the ability to forecast weather conditions in mountainous terrain, thereby improving aviation safety in this area.

The term "smog" is often used to refer to the complex mixture of air pollutants resulting from atmospheric reactions of emission

species (both natural and manmade) in the presence of sunlight. Over the past few decades, atmospheric scientists have learned



Dr. S. Kent Hoekman



Dr. Vanda Grubišić.



A smog chamber.



A portion of the Emperor Qin's Terra-Cotta Warriors and Horses Museum.



much about smog-forming chemistry. One very useful technique involves laboratory facilities known as “smog chambers.” By carefully controlling chamber conditions (pollutant mix, temperature, humidity, light intensity, etc.) and closely monitoring the course of reactions, smog formation mechanisms can be investigated and potential mitigation measures can be tested.

Most experimental smog chambers are quite small in size, which is operationally convenient but not very representative of the true atmosphere. To overcome these limitations, DAS Research Professor Dr. Barbara Zielinska has recently conducted smog chamber experiments in the very large European Photo-reactor (called EUPHORE) located in Valencia, Spain. In these experiments, exhaust emissions from a modern diesel engine were injected into the chamber and allowed to react under a variety of natural conditions. Extensive chemical analysis was conducted to characterize both gas-phase and particle-phase reaction products. In addition, pollutant samples were extracted from the chamber at various times and used in animal toxicology tests. While the results from this study are still being analyzed, preliminary findings indicate that the toxicity of the chamber samples varies considerably depending on the chemical conditions and the length of aging in the chamber.

In 1974, Chinese peasant farmers digging a well near the city of Xi'an discovered the long-buried tomb of Qin Shi Huang, the first emperor of China. Within this tomb are believed to be approximately 7,000 life-size terra-cotta warriors, horses, and chariots dating to the 2nd century B.C. So far, about 1,000 figures have been uncovered and restored. A modern structure has been built around

these figures and now comprises the Emperor Qin's Terra-Cotta Warriors and Horses Museum, which attracts over 2 million visitors annually.

Since these figures were uncovered, many have undergone significant deterioration in coloration and structure. DAS Research Professors Dr. Judith Chow and Dr. John Watson are participating in a scientific effort to discover the causes of this deterioration and recommend actions to prevent further damage. Other participants include scientists from the Chinese Academy of Sciences Institute of Earth and Environment, and the Hong Kong Polytechnic University. Atmospheric

conditions around the terra-cotta figures are now being closely monitored, including measurement of temperature, humidity, light conditions, molds, and air pollution. After one year of detailed sampling and characterization, these scientists hope to identify the most significant factors responsible for the figures' deterioration.

## AREAS FOR FUTURE EMPHASIS

Besides the traditional, on-going core research areas of the division, DAS faculty are continually expanding their interests into related fields. In recent years, this has included dust research, visibility science, advanced computation and visualization, fire science, health-related research, mercury science, and renewable energy assessments. In the coming years, we anticipate further growth in all these areas, and I look forward to reporting on our progress.

Sincerely,

A handwritten signature in black ink, appearing to read "S. Kent Hoekman".

Dr. S. Kent Hoekman  
*Executive Director*  
*Division of Atmospheric Sciences*

For additional information about DAS, please refer to the web site at [www.das.dri.edu](http://www.das.dri.edu)

## Dear Colleagues and Friends:

The Division of Earth and Ecosystem Sciences (DEES) is a remarkably diverse collection of scientists, with a range of research interests and expertise that challenges any simple categorization or single research focus. In broadest terms, DEES scientists all contribute to a greater understanding of the history and processes affecting landscapes, the Earth's surface, and its living inhabitants. For additional information about DEES, please refer to the web site at [www.dees.dri.edu](http://www.dees.dri.edu).

The division presently is comprised of 48 research faculty, with a nearly equal representation of archaeologists, biologists, and geoscientists. Approximately three-quarters of the faculty reside in Reno with the remainder residing in Las Vegas. Presently,

there are also 9 technologists, 16 graduate students, 3 post-doctoral students, and associated support staff. Total annual research expenditures for the division are approximately \$8 million.

Research expertise within DEES spans the classical disciplines of archaeology, biology, and geology. Archaeological research is focused largely on heritage management, prehistory of the western United States, human adaptations in arid lands, and the emerging field of Cold War historic preservation. Biological expertise runs the gamut from ecosystem, landscape, and microbial ecology to ecophysiology, genomics, and astrobiology—the study of the origins, evolution, and distribution of life in the universe. Expertise in the geosciences is equally diverse, spanning geomorphology, geochronology, natural hazards, and pedology. Faculty members across all three broad disciplinary areas possess skills in remote sensing and geographic information systems.

## RESEARCH HIGHLIGHTS FOR FISCAL YEAR 2006

At any given time, DEES researchers are involved in over 70 research projects. To illustrate some recent scientific accomplishments within the division, I would like to highlight three specific project areas.

During the late 1950s, the U.S. Atomic Energy Commission, predecessor to the present-day U.S. Department of Energy (DOE), developed the Plowshare Program to study the feasibility of using nuclear explosives for civilian purposes, such as harbor and canal excavation, coal gasification, and dam construction. Since the end of this program in the 1970s, knowledge of the scope and breadth of the effort largely had been lost. The importance of understanding

the extent of this work was highlighted when many years later the public raised concerns about Project Chariot activities in Alaska. The lack of institutional memory resulted in DOE cleanup activities that were more extensive than the original field assessments. Following this effort, DOE turned to DRI to gather data on the impact of Plowshare projects on the environment.

Dr. Colleen Beck and Susan Edwards, DEES archaeologists and historic preservation specialists, have been studying the history of the Plowshare Program to provide the agency with data regarding any potential environmental liabilities. Beck and Edwards' work has surprisingly revealed more than 150 named projects proposed in 20 states. They have completed field evaluations at 19 project locations where Plowshare scientists conducted preliminary work for proposed nuclear projects and high-explosive scaling experiments. With the information from Beck and Edwards' research, DOE will be able to more effectively manage its responsibilities on the landscape.

Conducted in the late 1960s as part of the Plowshare Trans-Isthmian canal studies, Project Pre-Gondola used 420 tons of high explosives to blast this trench at the edge of the Fort Peck Reservoir in northeastern Montana.



DEES scientists Drs. Paul Verburg, Jay Arnone, Giles Marion, and Eric McDonald are investigating the potential impact of global climate change on inorganic carbon dynamics in Mojave Desert ecosystems with a project funded by the National Science Foundation. Field manipulation studies are being conducted at the Nevada Test Site near Las Vegas, while greenhouse experiments are being carried out in EcoCELLs within the DRI Frits Went Laboratory in Reno. These studies have been designed to investigate how global change might affect the dynamics of inor-



Dr. Michael Auerbach





EcoCELLs in DRI's Frits Went Laboratory.

Associate Research Professor Dr. Duane Moser and an international suite of colleagues have discovered an isolated, self-sustaining, microbial community living under extreme conditions almost two miles beneath the Earth's surface in a South African gold mine. This community of microorganisms may be the first demonstrated to subsist purely on geologically produced substrates (sulfate and hydrogen), as well as one of the few ecosystems on Earth to operate independently of the sun, relying instead on energy from the decay of radioactive rocks. The discovery, which appeared in the journal *Science*, raises the possibility that similar life could exist beneath

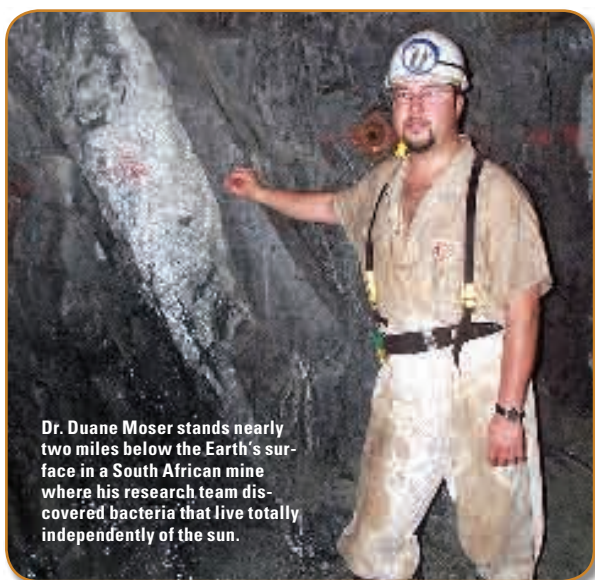
organic soil carbon pools, which are comparable in size to atmospheric carbon-dioxide-based carbon pools.

Specifically, this study will determine the effects of increased precipitation, nitrogen deposition, and concentration of atmospheric carbon dioxide on the carbon dioxide concentrations in the soil, as well as levels of soil moisture, the two most important factors influencing soil inorganic carbon dissolution and precipitation. The net result will be a much better understanding of how global change will influence carbon dynamics in arid ecosystems.

the surface of other worlds, such as Mars or Jupiter's moon Europa.

## AREAS FOR FUTURE EMPHASIS

The Division of Earth and Ecosystem Sciences will maintain its cutting-edge archaeological, biological, and geological expertise, while adding faculty in new disciplinary areas and increasing strength in others. In the very near term, DEES will enhance its capability to conduct research on the health effects of environmental change, as well as the use of advanced remote sensing to predict environmental change and assist in resource planning. The division also plans to increase the scope of its archaeological research through new faculty.



Dr. Duane Moser stands nearly two miles below the Earth's surface in a South African mine where his research team discovered bacteria that live totally independently of the sun.

Sincerely,

Dr. Michael Auerbach

*Executive Director*

*Division of Earth and Ecosystem Sciences*

For additional information about DEES, please refer to the web site at [www.dees.dri.edu](http://www.dees.dri.edu)

## Dear Colleagues and Friends:

Since its inception in 1960, the Division of Hydrologic Sciences (DHS) has grown steadily and built a strong program of research, development, and education in the field of hydrologic sciences. The division's scientific focus involves the natural and human factors influencing the availability and quality of water resources.



Dr. John J. Warwick

Nevada is the driest and most mountainous of the 50 states, circumstances that focused the early research efforts of DHS on the nature of water resources within the complex geology of the state's many isolated groundwater basins and on the topic of regional groundwater flow. However, a significant amount of drinking water is derived from surface water sources, making surface water quantity and quality

critically important issues in the developing western United States. The scientific areas currently encompassed by the division reflect issues and concerns common to arid and developing regions worldwide. Consequently, the scope and relevance of this research extends well beyond the borders of Nevada and the nation. The division has over 60 ongoing research projects with annual extramural research expenditures of \$12 million.

Research is conducted from office and laboratory facilities at the southern campus in Las Vegas and the northern campus in Reno, with approximately 90 employees between the two offices. The DHS research program results from a dynamic interplay between the problems important to our state, our region, and our nation; the expertise of our faculty; and the availability of research funding. A natural extension of our research is an examination of the relationship of hydrologic research objectives to the needs of water resources policy and management. This analysis is conducted from the perspective of potential applications of emerging technology and identification of specific areas where research would likely benefit the management and policymaking process.

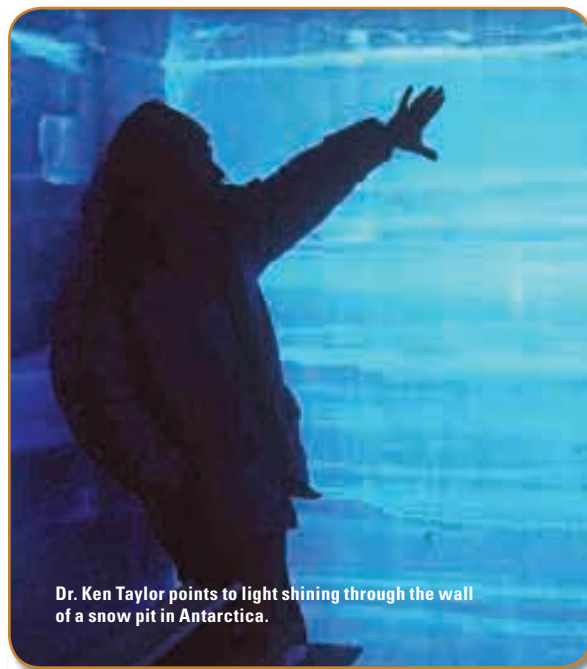
In addition to their research, many DHS faculty hold joint appointments in water resource-related academic departments at the University of Nevada, Reno, and the University of Nevada, Las Vegas, where they teach courses and fund and advise graduate students. During the past five years, over 60 graduate students have been employed on DHS projects. Conversely, DRI

is able to draw on the variety of expertise available within the Nevada System of Higher Education and to involve faculty and students in collaborative research efforts.

## RESEARCH HIGHLIGHTS FOR FISCAL YEAR 2006

As stated, DHS faculty members are involved in over 60 research projects at any given time. To illustrate some recent scientific accomplishments within the division, I would like to highlight two specific project areas: the West Antarctic Ice Sheet (WAIS) Divide project and some of our work in groundwater flow and radionuclide transport modeling.

DRI was recently awarded a National Science Foundation grant to conduct and lead the WAIS Divide ice core project (<http://waisdivide.unh.edu>). DHS Research Professor Dr. Ken Taylor is leading this project—a collaboration of 20 institutions—to investigate issues that are highly relevant to society, including how to better predict future climate and sea level changes. It will take seven years to develop a paleoclimate and



Dr. Ken Taylor points to light shining through the wall of a snow pit in Antarctica.

paleoatmospheric record from a 3,500 meter deep Antarctic ice core, which will enhance our ability to understand how current increases in greenhouse gases will influence future climate. The drill site is the best place on the planet to investigate the influence of greenhouse gases on climate that



Monitoring wells being drilled at the Central Nevada Test Area.



have occurred over the last 100,000 years. The project is a cornerstone in the International Geophysical Year activities sponsored by the National Science Foundation once every 50 years. This project also includes mass media outreach and educational components, so it will be possible to chart our progress on the web site.

The groundwater flow and radionuclide transport modeling, performed by a team of DHS researchers for two underground nuclear tests in rural Nevada, guided the siting of new monitoring wells in both locations. DRI located and designed three wells installed at the Shoal site, east of Fallon, and three wells for the Central Nevada Test Area (CNTA), located between Ely and Tonopah. These wells range in depth from 1,200 to 4,200 feet and represent a significant improvement in monitoring the vital groundwater resources in those areas and protecting the public. Given the scarcity of deep wells in such rural areas, the aquifer testing and sampling represents a major improvement in groundwater knowledge at the sites. DRI is collecting data from these wells to update groundwater model predictions and more accurately forecast contaminant migration. DRI also developed Groundwater Management Models of Shoal and CNTA to allow the U.S. Department of Energy and State of Nevada to readily assess the possible impacts of future groundwater development

in the basins. These user-friendly, interactive management tools can evaluate the effect of groundwater pumping activities on groundwater flow at the sites and can be used for hypothesis testing of possible pumping scenarios, allowing managers to efficiently balance resource accessibility with public protection.

### AREAS FOR FUTURE EMPHASIS

The Division of Hydrologic Sciences continues to maintain its critical mass of cutting-edge researchers in traditional areas of surface and subsurface hydrology. Increasingly, hydrology is interfacing with fields beyond the physical sciences, for example, aquatic ecology. The division has recently increased its faculty expertise in the emerging area of ecological engineering, described by Dr. William J. Mitsch, Distinguished

Professor of Natural Resources and Environmental Science at The Ohio State University, as “the design of sustainable ecosystems that integrate human society with its natural environment for the benefit of both,” while also embracing the biological aspects of limnology and stream ecology. This evolving interface between biology and hydrology is essential to the expanding enterprise of stream restoration. Clearly, interdisciplinary work is a natural evolution for DHS and will become a hallmark of our research in the future, and with that goal in mind, the future looks bright, indeed.

Sincerely,

Dr. John J. Warwick

*Executive Director  
Division of Hydrologic Sciences*

For additional information about DHS, please refer to the web site at [www.dhs.dri.edu](http://www.dhs.dri.edu)

AEA Technology & Engineering	County of San Luis Obispo, CA
Aerosol Dynamics, Inc.	Cyanco, Inc.
Aerospace Corporation	Denise Duffy & Associates
Air Resource Specialists, Inc.	Distributed Generation Systems, Inc.
Air Sciences, Inc.	E.H. Pechan & Associates
American Petroleum Institute	Eastern Research Group, Inc.
American Water Resources Association	EDAW, Inc.
Applegate School for Dogs	Electric Power Research Institute
Arcadis, Geraghty & Miller, Inc.	Emory University
Atmoslytic, Inc.	Encapco Technologies, LLC
ATS Chester Engineers	Environ International Corporation
Baldwin Environmental, Inc.	Environment Canada
Battelle Pacific Northwest Division	Environment Canterbury
Bay Area Air Quality Management	Esmeralda County Soil Conservation District
Ben Gurion University	Ford Motor Company
Bergische University	Florida State University
British Petroleum Exploration	Fluor Federal Services
California Air Resources Board	FPM Group, Ltd.
California Department of Boating and Waterways	G.C. Wallace, Inc.
California Department of Forestry and Fire	Gabriel Lopez
California Department of Water Resources	Gary M. Curcio
California Energy Commission	Geo-Haz Consulting, Inc.
California Institute for Energy and Environment	Geological Survey of Israel
California Integrated Waste Management Board	Geo-Marine, Inc.
Cantor Fitzgerald	Georgia Institute of Technology
Carey & Company	Great Basin Institute
Charles Blanchard	Great Basin Land and Water
City of Albuquerque	Great Basin Unified Air Pollution Control District
City of Fernley	Harvard School of Public Health
City of Reno	Harvard University
Clark County	Health Effects Institute
Clark County Department of Air Quality Management	Hebrew University of Jerusalem
Clark County School District	Hong Kong Baptist University
Collier Tech	Hong Kong Environmental Protection Department
Colorado State University	Hualapai Tribe
Columbia University	Huffman and Carpenter, Inc.
Computer Sciences Corporation	Humboldt River Basin Water Authority
Conrad Hilton Foundation	Idaho Power Company
Coordinating Research Council	Industrial Economics, Inc.



Industrial Hygiene Tech	R.J. Lee Group, Inc.
Information Manufacturing Corporation	S.M. Stoller Corporation
Iowa State University	San Diego State University Foundation
Iowa State University - Virtual Reality Applications Center	San Joaquin Valley Air Pollution Study Agency
JBR Environmental Consultants	San Jose State University Foundation
Joint Fire Sciences Program	Science Applications International Corporation
Knight Piesold Consulting	Scripps Research Institute
Lovelace Respiratory Research Institute	Sempra Generations
MACTEC-ERS	Seraphim
Meteorological Service of Canada	SETEC Ltd.
Mountain Wind Energy, LLC	SI International
National Aeronautics & Space Administration	Sierra Nevada Corporation
National Center for Atmospheric Research	Snowy Hydro, Ltd.
National Observatory of Athens	Sonoma Technology, Inc.
National Renewable Energy Laboratory	South Coast Air Quality Management District
National Science Foundation	Southern Nevada Water Authority
Natural Resources Canada	Southwest Clean Air Agency
Naval Post Graduate School	Southwest Research Institute
Nevada System of Higher Education	SpecTIR, Inc.
New York State Department of Environmental Conservation	Star Mountain Development, LLC
Newmont Mining Corporation	State of Arizona - Department of Environmental Quality
Nichols Consulting Engineers	State of Idaho - Department of Environmental Quality
North American Weather Consultants	State of Nevada
North Carolina Department of Environment and Natural Resources	State of Nevada - Department of Agriculture
North Carolina State University	State of Nevada - Division of Environmental Protection
Northeastern Fire Fighters Command	State of Nevada - Office of Energy
Olson Ecologic	State of New York
Ormat Nevada	State of Oklahoma - Department of Environmental Quality
Pacific Northwest National Laboratory	Tahoe Regional Planning Agency
Pennsylvania State University	T & B Systems
Phelps Dodge Miami, Inc.	Tennessee Valley Authority
Placer County Air Pollution Control District	Tetra Tech, Inc.
Plumas Corporation	Texas Commission on Environmental Quality
Pyramid Lake Paiute Tribe	Ivar Tombach
Rapid Creek Research, Inc.	Truckee Meadows Water Authority
Refuse, Inc.	U.S. Agency for International Development
Reno-Sparks Indian Colony	U.S. Department of Agriculture
Research Triangle Institute	U.S. Department of Agriculture - Forest Service
Retec Group, Inc.	U.S. Department of Commerce

U.S. Department of Commerce - National Oceanic and Atmospheric Administration	University of Illinois, Chicago
U.S. Department of Defense	University of Illinois, Urbana-Champaign
U.S. Department of Defense - Areas for Capability Enhancements	University of London
U.S. Department of Defense - Office of Naval Research	University of Montana
U.S. Department of Defense - Strategic Environmental Research and Development Program	University of Nebraska, Lincoln
U.S. Department of Education	University of Nevada, Las Vegas
U.S. Department of Energy	University of Nevada, Las Vegas - Harry Reid Center
U.S. Department of Energy - Los Alamos National Laboratory	University of Nevada, Reno
U.S. Department of Energy - National Renewable Energy Laboratory	University of New England, Australia
U.S. Department of Energy - Oak Ridge National Laboratory	University of New Hampshire
U.S. Department of Energy - Sandia National Laboratories	University of Oklahoma
U.S. Department of the Interior	University of Oklahoma, Norman
U.S. Department of the Interior - Bureau of Land Management	University of Pittsburgh
U.S. Department of the Interior - Bureau of Reclamation	University of Southern California
U.S. Department of the Interior - Fish and Wildlife Services	University of Tennessee - Battelle, LLC
U.S. Department of the Interior - Geological Survey	University of Texas at Austin
U.S. Department of the Interior - National Park Service	University of Texas at San Antonio
U.S. Department of Transportation	University of Utah
U.S. District Court Water Master	University of Washington
U.S. Environmental Protection Agency	University of Wisconsin, Madison
University Corporation for Atmospheric Research	University of Wisconsin, Milwaukee
University of Arizona	University of Wyoming
University of Arkansas	Vidler Water Company
University of Calgary	Visibility Improvement - State and Tribal Association of the Southeast
University of California, Berkeley	Walker River Irrigation District
University of California, College of Engineering - Center for Environmental Research and Technology	Washington University, St. Louis
University of California, Davis	Washoe County
University of California, Lawrence Berkeley National Laboratory	Washoe County Department of Water Resources
University of California, Merced	Washoe County School District
University of California, Riverside	Waste Management, Inc.
University of California, San Diego	West Virginia University
University of California, Santa Barbara	Western Governors Association
University of California System	Winrock International
University of Delaware	World Bank
University of Guelph	World Vision, Inc.
University of Houston	Yankee Caithness
	Yerington Paiute Tribe



## Dear Friends:

It is my pleasure to report to you on the DRI Research Foundation's activities during FY 2006. The year was very successful in terms of both fundraising and "friendraising."

Fundraising highlights included:

- Our highest-netting Nevada Medal Dinners in the history of the event, thanks in large part to the "Chancellor's Challenge" and the people who rose to the challenge.
- Record-breaking revenue for our annual golf tournament.
- A 38 percent increase in unrestricted revenue, which will make it possible for us to respond to DRI's greatest needs as they arise.

In addition to fundraising, the Board was also involved in a series of "friendraising" activities, including the Foundation's annual Washington, D.C. reception for the Nevada delegation and staff members; the premier of the documentary, "Running Dry," in both Reno and Las Vegas; and DRI's first-ever Open House, which brought more than one thousand visitors to the Reno campus.

As part of the Foundation's outreach efforts, funds were also raised to support new GreenPower schools, bringing the total number of sites to 13 throughout the state.

Fiscal Year 2006 was also an excellent year for recruitment, and I am pleased to report that in December, the



Senator Bernice Mathews and Chancellor James Rogers at the Reno Nevada Medal Dinner.

Nevada System of Higher Education Board of Regents approved the addition of the following outstanding community leaders to the DRI Research Foundation Board:

Dan Barnett, Kirk Clausen, Chuck Creigh, Thomas E. Gallagher, Judi Gardner, Kathy Hone, Peter Kovacs, Jim Kropid, Paul Laxalt, Sandy Masters, Kristin McMillan, Maureen Mullarkey, Ian Rogoff, and Marlene Wheeler.

They will officially begin their tenure on the Foundation at the February 2007 Board meeting.

Finally, I am especially happy to report that our Foundation audit was completed with an unqualified clean opinion.

I would like to thank our generous donors and all of you who took the time to attend DRI's events during the past year. We know you have very full schedules, so your time is very meaningful to us. You have our sincere appreciation for everything you do for DRI and the DRI Research Foundation.

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth G. Ladd".

Kenneth G. Ladd  
*Chair*  
DRI Research Foundation



Left to right: DRI Research Foundation Chair Ken Ladd, 2006 Nevada Medalist Dr. Walter Alvarez, Dee Ladd, and DRI President Dr. Stephen G. Wells at the 2006 Las Vegas Nevada Medal Dinner.

\$100,000—\$500,000

Nevada Power Company • Sunbelt Communications Company/Jim & Beverly Rogers

\$25,000—\$49,999

Barrick • Nevada Test Site Historical Foundation • Sierra Pacific Power Company

\$15,000—\$24,999

AT&T Nevada • Bechtel Nevada Corporation • Caesars Palace • Fred D. Gibson, Jr. • Reno Hilton • Resort at Red Hawk • Sierra Pacific Foundation • Charles H. Stout Foundation

\$10,000—\$14,999

Ami Jewelers • Skylo & Cathy Dangler • FASTFRAME • Robert Z. Hawkins Foundation • KOLO News Channel 8 • Nevada State Bank • Bob & Del Noland • Sprint • TILECO NV/Tom Aleo • Warren & Jâlé Trepp • UNLV Research Foundation • U.S. Bank • Wells Fargo Foundation

\$5,000—\$9,999

Advertising Specialties • American Pacific Corporation • Robert R. Banks Foundation • BankWest of Nevada • Bear Industries/Jerry & Judi Cail • Michael & Leah Benjamin • Catamount Fund, Ltd. • Conservation District of Southern Nevada • Charles & Nancy Goldman • IGT • Bruce & Nora James • JMA Architecture Studios • Lennar Communities - Reno • Lennar Reno, LLC • Christopher & Sara Maples • Martin-Harris Construction • Claudia Miner • Nevada Community Foundation • Nevada State Office of Energy • Newmont Mining Corporation • North American Title Company • Rollermonkey Design • Richard Scott & Vicki Hafen Scott • Sierra Pacific Resources • Southern Wine & Spirits • Southwest Gas • State of Nevada Department of Education • Thunder Canyon Golf • Stephen & Bethany Wells • Wells Fargo Bank • Yardage Company

\$2,500—\$4,999

A Frame of Mind Gallery/J.T. & Lindé Ravizé • Ameriprise Financial • Steve & Linda Buszka • Ken & Linda Ciriacks • Fagen Family Charitable Fund • Robert “Bob” & Donna Goff • Jeffrey Herhold • Ken Ladd • City of Las Vegas/Mayor Oscar Goodman • Lennar Reno/Barker Coleman • Kathleen Mahon • Jennifer Patterson • Pepsi • Pulte Homes of Nevada • Regional Transportation Commission • Reno Gazette-Journal • Tom & Susan Schoeman • Steve Snyder • Summit Engineering/Tom Gallagher • Universal American Mortgage Company • Patty Wade • John & Christine Worthington

\$1,500—\$2,499

ALPHA Services/Jeanne Jones • American Nevada Holdings, LLC • Anderson Dairy • Bechtel SAIC Company • Bennett & Jiminez, Inc. • Boomtown • Ralph J. Brodd • Casa Blanca • Catholic Healthcare West • Custom Tile/Donald Watts • Chuck Dornbach • Mark Fox • Franke Contract Group • Linda Furgeson • Jason Glavish • Lee Hallerberg • Hello World Travel • Douglas Roman Hill & Susan Hill • Richard & Sheila Horton • Howard Hughes Corporation • Las Vegas Convention & Visitors Authority • James E. Mattingly • John A. McDonald • Nevada Mining Association • Nevada System of Higher Education • Pam Parenti • Pavers Plus • Peppermill Hotel Casino • Q&D Construction Inc. • Queensridge Towers/Executive Homebuilders • R & R Partners Las Vegas • Senator William & Dale Raggio • Red Hawk Travel & Leisure • Rhodes Homes • Sierra Health Services, Inc. • Southwest Airlines • Squaw Valley Ski Resort • Ted Stoeve • Van Noy Consulting Group • Marianna Vaughan • Wackenhut Services, Inc. • Kristina Wagner • Sue Wagner • West Haven Development Group

---

\$1,000—\$1,499

3D Electric/Dick Pugh • J. Robert & Carole Anderson • Associated Management • James & Mary Ellen Bahan • Bruno & Edna Benna • Jerry Bussell • Robert Chavez • Circus Circus • Clark and Sullivan Constructors • Robin & Dawn Coots • Hilary Crowley • DP Advisors, LLC • Pete Ernaut • Jeffrey S. Fischer • David & Diane Fulstone II • Carl Garlington • GenCorp Foundation • Hale Lane Peek Dennison & Howard • J. Scott Hauger • Walt Higgins III • Harry & Rita Huneycutt • Imperial Palace • InSORS Integrated Communications • Roger & Ellen Jacobson • Janus Land and Building Company, LLC • Jim's Custom Paint • Jones Vargas • KNPR Nevada Public Radio/John Curtas • Warren Kocmond • Ron & Susan Krump • Las Vegas Harley Davidson • Paul & Janet Laxalt • R. Lichter • Lionel Sawyer & Collins • Eric & Michelle Lopez • Tim & Donna Maland • Don M. McHarg • Mill Direct Services/Martin McGhin • Gov. & Mrs. Bob Miller • Michael Minden Jewelers • Raymond A. Nash, Jr. • Nevada Alliance for Defense, Energy & Business • Roger Norman • Opportunity Village Foundation • R & R Partners Reno • David E. Reynolds & Dr. Gary Yup • Sierra Chemical Company/CFR Services • Shirley Morgan Smith • Summit First Financial Group/Sandy Masters • SVWB Architects • Senator Randolph J. Townsend • Terry & Betsy Van Noy • Van Scoyoc Associates • Wade Development Company, Inc. • Washoe Medical Center • Melanie Wetzel

---

\$500—\$999

American Casino & Entertainment • Dr. & Mrs. Arthur Anderson • Nazir & Mary Ansari • Arrow Creek Golf Course • Atkinson & Atkinson, CPAs • Janice E. Azevedo-Hirayama • Brian Benevento/B&B Technical Designs • Shannon Bilbray & Danny Axelrod • Phyllis Birch & Jim Waugh • Builders Association of Northern Nevada • Robert Cannon • Clipper Family Trust/Cecil Clipper • Ryan Coots • D. Allison Copening • CR Engineering • Dayton Valley Golf • John Doherty • Regent Thalia Dondero • Farouk El-Baz • Eldorado Hotel & Casino • John & Dee Ellis • Jerry & Lou Emmert • Doug Eubank • Bob Freudenthaler • Fuller Color Center/Clay Carter • John Gardner • Cary Groth • Groves-Fischer/Jeff Fischer • Eleanor Hagler • Tom Hall • Harrah's/Harveys Lake Tahoe • Harris Consulting Engineers • William T. Hartwell • Kent & Janet Hoekman • Jeff Hollingsworth • D.R. Horton/America's Builders • Debra Jacobson • Ronald G. Kalb • Stan Kinder • Omer & Claudia King • Noah Kohn & Erin Bilbray-Kohn • Chris Kralt • Jim & Judy Kropid • KUNR-FM • Las Vegas Hilton • The Legacy Golf Club • Lucini & Parish Insurance • Rebecca Miner • Tim Minor • Northern Nevada Science Coalition • Painted Desert Golf Club • Paradigm Winery • Robert & Cecilia Pearce • PK Electrical • R. Herz & Brothers Jewelers • Paul Raglin • REMSA • Reno Air Races • Reno Mattress Company • Dave Richardson • Ryder Homes of Nevada • Sylvia Samano • Mrs. Gene Segerblom • Larry Sheetz • Sierra Nevada College • Sierra Office Solutions • Jim & Colleen Taranik • William "Tom" Thomas • Richard Tracy • UNLV • Troy Wade II • Rebecca Wagner • Mike & Kenda Walters • Wal-Mart Foundation • Janet Maureen Warden

---

\$250—\$499

1st National Bank of Nevada • 24 Hour Fitness • Affordable Concepts, Inc. • Michael Ames/Ames & McCreary, Inc. • Arrowleaf Golf Course • Atomic Testing Museum • Troy & Selma Bartlett • Tony Berendsen • Peggy Bostian • City of Boulder City/Mayor Bob Ferraro • Dr. Reinhard Bruch • Buggs & Rudy Discount Corp. • Danny Callejo • Carriage House • The Colosseum at Caesars Palace • Ed Curry • McKay Daniels • Steven & Fini Dobyns • Dreamcatcher Photography • Steve & Mendy Elliott • Empire Ranch Golf Course • U.S. Senator John Ensign • Garden Shop Nursery • Golf Headquarters • James & Barbara Gray • Joe Guild • The Gun Store, Inc. • Jeffrey Henning • John & Letitia Hess • Tamara Higgins • John Howanitz • Patricia Hughes • William Kaercher • Leslie Kennedy • Bobbie Jo Kinsey • Kate & Jay Kirkpatrick • Andrea Knapp • KNPB Channel 5 Public Broadcasting, Inc. • Virginia Knudsen • Roger & Betsy Kreidberg • Joseph Laiacona • Nick Lancaster • Las Vegas National Golf Club • Dr. Barry Lasko, DDS • Gene Laughton • Cindy Littlefield • Stephanie A. Luongo • Ian & Carol Mackinlay • Doug Maselli • Dick & Charlotte McConnell • Mechanical Contractors Association • Midnight Cellars Winery & Vineyard • Bret Monaghan • Monte Carlo Hotel & Casino • Morrey Distributing/Colin Duras • Nevada Community Foundation (C. Corbett Fund) • Nevada Public Radio • Rick Normington • D. Warner & Cherie North • Northgate Golf Course • Randy & Margaret Odden • Tamra O'Halloran • Janet Pahl • Anthony J. Pankowski • PDQ Shell • George F. Peek/ERGS, Inc. • Gordon & Cecile Peters • Juliet S. Pierson •



Precision Diamonds • Kelly Redmond • John Rhodes • James Richardson • Jim & Wendy Romaggi • Room Decor & More • Regent Howard Rosenberg • Greg Schultz • Joey E. Scolari • Craig & Melanie Scott • Saxon Sharpe & Floyd Dean • Dan Shaw • Silverstone Golf Club • Skagen Designs • Eric & Julie Skinner • Kathleen Smith-Miller & Franklin Miller • Sports West • Sun City Summerlin • Lee & Virginia Suttner • Terrible's Hotel Casino • Thunder Canyon/Dave La Fata • TJK Consulting Engineers • UNLV Women's Basketball • Elmer & Esther Vacchina • Charles Van Geel • Jonelle Vance • Mary Lou Veit • Richard Vineyard • Irene Vogel • Voila Catering • Bill Welch • Western Turf • Steve Wheatcraft • Wild Creek Golf • Beth Williams • Wolf Run Golf Club • Michael Wurm • Cyndi Yenick • Barbara Yoerg • Desi & Karen Zamudio

---

## \$100—\$249

A Gorgeous Gown Bridal Boutique • Barbara Agonia • Albertson's/Kietzke • Albertson's/Prater • Aliante Golf Club • Rob & Jackie Allen • Juliana Anderson • Michael & Nitsa Auerbach • Donald L. Bailey • Georgia & Dexter Baker • Joe M. Beard • Beckley Singleton • Bergdahl Associates, Inc. • Philip Bevins • Big O Tires • Norma Biggar • The Bijou • Black Canyon/Willow Beach River Adventures • Black Mountain Golf • Bobo's Mogul Mouse • Bonanza Casino • Daniel Francis Botwinis • Boyd Gaming Corporation • Mark Brenner • Bricks Restaurant • Alice Brown • Cynthia Burk • Leslie Caprow • Marla Carr • Robert E. Carroll • Tim Cashman • Sudeep Chandra • Bill & Marge Childs • Ingvart Christensen • David Clark • J.R. Clarkson • Charles T. Clay • Coast Casinos' Public Relations • Clay Cooper & Lori Carpenter • Krestine Corbin • Corral West • Teresa Courrier • Coyote Moon Golf • D'Andrea Golf Club • Beth Davis • DeliPlanet, Inc. • Diamond Peak Ski Resort • Gary & Linda Dierks • Frederick W. Dressler • William F. Durbin • Eagle Valley Golf Club • Elegant Party Rentals • Heather Emmons • William Eubank • Floral Expressions • Flowers by Patti • Foley's Irish Pub • Forever Yours Furniture • Karen Foster • Frank & Charlotte Franky • Furnace Creek Inn & Ranch Resort • Andrew Gabriel • Mark Gamba • Danny Gans/The Mirage Hotel • Kenneth & Jean Garey • Denise Gerbich • Congressman Jim Gibbons • Gold Dust West • Mitch Goldfin • Steven Graham • Greek Isles Hotel & Casino • Troy Gross • Fred Groves, Jr. • Harrah's Reno • Mary Lou Harris • John W. Hawley • Barbara Hinsvark • Chris Ho • Lisa Hoffman • Rick Holt • Douglas Hone • Hoodsport Winery • Angela Horning • Rod Hosilyk • John House • Robert Howard • Jenny Hull • Barbara Jackson • John Ascuaga's Nugget • R.R. "Casey" Jones • Terry & Virginia Katzer • K.G. Park Lines/K. Gottschalk • Brian Krolicki • Lake Mead Cruises • Lake Shastina Golf Resort • Lakeridge Golf Course • Kimberly Lanning • Las Vegas 51's Baseball • La Vecchia • The Lodge at Galena • Lone Oak Lodge/R. Quaglia • Luciano's • Pat Lundvall • Marina Hand Car Wash • Cleve McDaniel • McGhie's Ski-Bike-Board • Martha McRae • Nanette Merlino • Mimi's Café • Mission Car Wash • Moana Nursery • Judy Moss • Mt. Rose Ski Tahoe • Chris Mulloy • James L. Murphy • Nevada Woman Magazine • Oak Furniture Mart • Patrick James Men's Clothing • Mary Peoples • Charlene Peters • Gary Pigoni • Playful Potter • Michelle Pooser • Karen Purcell • Quizno's • Ramone Sterling Agency, LLC • U.S. Senator Harry Reid • Mary Reimer • Reno Gallery of Furniture • Reno Lawn & Landscape • Reno Toyota • Ed Ricks • Ken Ries • Marc Rivera • Bradley H. Roberts • Elizabeth Robinson • Rogich Communication Group/Sig Rogich • Rosewood Lakes Golf Course • Kyle Ruf • Dee Sargent • Scott Scherer • Fred Schmidt • Mary Lee Schmidt • Arne Schoeller • Mary (Liza) Schumacher • Richard & Susan Schweickert • Scolari's • Shoppers Square Mall • Sierra Classic Foods/Danielle Velasquez • Sierra Sage/Washoe County Golf • Mary Simmons • Roger Slaboch • Deborah Smith • SPCA • SPI Entertainment • Stations Casinos • Sugar Bowl • Alfred Taeubel • Tamarack Junction • William & Sally Tappan • TGI Friday's • Jim Thomas • William & Elizabeth Thomas • John Tracy & Julie Pierko • Truckee River Bar & Grill I • Truckee River Bar & Grill II • Kirk Turner • UNR Department of Athletics • Paul Verburg • Greg Vorreyer • Kelsey Walker • Robert C. Weems • Westport Rivers Vineyard • John Whipple • Whispering Vine Wine Company • Bob Wilkie • Phil Williamson • Mr. & Mrs. Anthony H. Wirtz • Ming Xiao • YMCA of Southern Nevada • Michael Young

A. Carlisle & Company of Nevada • Airport Plaza • Bill Albright • Carmen & Joan Annillo • Anonymous • Applebee's • W.T. & Jean Ashby • ASUN Bookstore • Tom & Barbara Atkinson • Atlantis Casino Resort Spa • A.U. Smith Jewelers • Austin's Family Restaurant • Baja Fresh • William R. Beck • Bed Bath & Beyond • Senator Bob Beers • Benson's Feed & Tack • Congresswoman Shelley Berkley • Bertha Miranda's Mexican Restaurant • Big 5 Sporting Goods • Big Mama's Soul Food • BJ's Nevada BBQ • Black Bear Diners, Inc. • Blue Moon Pizza • Lisa Boldman/Inizio Salon • Lou & Candace Borrego • The Boulevard Mall • BRUKA Theatre • Buenos Grill • Buggy Bath Car Wash • Bully's Sports Bar and Grill • Butcher Boy • Cake and Flower Shoppe • Carson Oak Outlet • Celtic Touch Massage • Claim Jumper Restaurant • Clay Canvas • Cold Stone Creamery • Costco Wholesale • The Cracked Egg • Russell C. Cullison • Fred Davis • Susan Desilva • William Dippel • Desiree Donahue • Laura Edwards • El Adobe Café Mexican Restaurant • Executive Gift Source • Clyde C. Fancher • Bernice Fischer • Susan Fisher • Flamingo Las Vegas • W.G. Flangas • Flowing Tide Pub • Stuart Floyd • Four Seasons Hotel • Kathleen Frantz • Freed's Boulevard Bakery • Furniture Source • GameWorks • Gandhi India's Cuisine • Assemblywoman Heidi Gansert • Maria Garretson • Joy Giffin • Godfather's Pizza/Clearacre • Jack Goetz • Gold 'N' Silver Inn • The Golf Club at Fernley • Keith Gottschalk • Grandma's Fudge Factory • Grape Street Café Wine Bar • Great Harvest Bread Company • The Grill at Quail Corners • Michael Haley • Harrie's Bagel Mania • Healing Wizdom • City of Henderson/Mayor Jim Gibson • Mary Henderson • High Sierra Lanes • Sarah Hill • Lynn Himmel • Mary Ellen Hogan • Hoagie Hut • In-N-Out Burger • Jamba Juice • Java Jungle • JJ's Pie Company • Juicy's Giant Hamburgers • Jungle Vino • Barbara Kennedy • John T. King • John & Beverly Kirkpatrick • Hal Klieforth • Melissa Koch • La Pinata • Labels Consignment Store • Ladd Services • Ladeki Restaurant Group • Lake Tahoe Shakespeare Festival • Erin Lara • Loring Larsen • LaundryMutt Pet Stylin' • Mike Lemley • Liberace Center for the Arts • Louis Basque Corner • LynOaken Farms/The Apple Depot • Magic Carpet Golf • Assemblyman Mark Manendo • Marble Slab Creamery • David Marz • Senator Bernice Mathews • Commissioner Chip Maxfield • Robert W. McCoy • Metro Pizza • Larry R. Metzger • Tod Mihevc • Anonymous • Mary Ann Moran • John Mudge • Napa Sonoma • National Automobile Museum • Stephanie Neal • Paul Neeley • Nevada Magazine • Nevada Museum of Art • Nevada Opera Association • Graig D. Newell • George Ochs • Maureen O'Bannon • Cindy O'Kelly • Olive Garden • Outback Steakhouse • PANEVINO • William Park • Payless Cleaners • Paymon's Mediterranean Café • Assemblywoman Peggy Pierce • Pizza Baron • PJ's & Company • William Platt • Katharine H. Pool • Port of Subs/Keystone • Congressman Jon Porter • Bob Potter • Howard & Carol Rand • Red Rock Canyon/BLM • Regis Hair Salon • Reno Philharmonic • C.O. & M.K. Riddleberger • Riviera Hotel & Casino • Ronald L. Roberts • Martha Romero • Chris Rounds • David Roundtree • Ruby River Steakhouse • San Francisco Giants • Cindy Sargent • Sherril Schmidt • See's Candies • Shakeji, Inc. • Silver Club • Silver Peak Brewery • John Smith • Sniff Candle Company • Sparks Florist • St. Rose Dominican • Charles A. Stickels • Ann Stine • Richard Stoddard • Alan Studebaker • Sundance Bookstore • Target Stores • Thai Royal House • Three Lakes Winery • Time Square Jewelers • Allyson Tippie • Senator Dina Titus • Top Hat Party Rentals • Trader Joe's • Jamie Trammell • Wal Mart - Carson/College Pkwy. • Wal Mart Carson City Store #1648 • Wal Mart Northtowne • Wal Mart #2106 • Wal Mart #2189 • David Warburton • John Warwick • Assemblywoman Valerie Weber • Robert G. Whittemore • Wild Island • Winner's Car Wash • Regent Michael & Heidi Wixom • John & Madelin Woodbridge • Woodworks/Judith Lancaster • Xcentrix Salon/Bonnie Schultz • Xcentrix Salon/Sheri Webster • Zen Skincare • Zo-Zo's Ristorante

## Officers

**Kenneth G. Ladd**, Chair: President, U.S. Bank Nevada (Las Vegas, NV)  
**John R. Worthington**, Co-Vice Chair: retired Senior Vice President, MCI Corporation (Reno, NV)  
**Michael Benjamin**, Co-Vice Chair: principal, Benjamin Enterprises (Las Vegas, NV)  
**Dr. Claudia Miner**, Secretary: DRI Vice President for Institutional Advancement (Reno and Las Vegas, NV)  
**Kathleen Badgett**, Treasurer: DRI Assistant Vice President and Controller (Reno, NV)

## Trustees

**Nazir Ansari**: Emeritus Professor of Management, University of Nevada, Reno • **Thomas Atkinson**: Certified Public Accountant, Atkinson & Atkinson CPAs (Reno, NV) • **Selma Bartlett**: Executive Vice President and Regional President, Bank West of Nevada (Henderson, NV) • **Erin Bilbray-Kohn**: political consultant (Las Vegas, NV) • **Dr. Ralph J. Brodd**: President, Broddarp of Nevada, Inc. (Henderson, NV) • **Dr. Kenneth W. Ciriacks**: retired, Vice President Technology, AMOCO Corporation (Tucson, AZ) • **David Clark**: founder, Janus Land & Building Company (Las Vegas, NV) • **D. Allison Copenig**: Senior Public Relations Specialist, Las Vegas Springs Preserve (Las Vegas, NV) • **J.L. "Skylo" Dangler**: President of Real Estate, Wingfield Nevada Group (Sparks, NV) • **Dr. Farouk El-Baz**: Director, Center for Remote Sensing, Boston University (Boston, MA) • **Lou Emmert**: Vice President and General Manager, Sprint (Las Vegas, NV) • **Dr. W. Michael Fagen**: venture capitalist (Reno, NV) • **Thomas H. Gallagher**: President and CEO, Summit Engineering Corporation (Reno, NV) • **Fred D. Gibson, Jr.**: former Chairman, President and CEO, American Pacific Corporation (Las Vegas, NV) • **Robert E. Goff**: founder and Chairman, Sierra Angels (Incline Village, NV) • **Dr. Charles Goldman**: Professor of Limnology, Department of Environmental Science and Policy, University of California, Davis (Davis, CA) • **Dr. Rudolf W. Gunnerman**: CEO and Chairman, Sulphco, Inc. (Sparks, NV) • **Fred Hamilton**: President and Publisher, Reno Gazette-Journal (Reno, NV) • **Walter M. Higgins III**: Chairman, President and CEO, Sierra Pacific Resources (Las Vegas, NV) • **Richard W. Horton, Esq.**: senior partner, Lionel Sawyer & Collins (Reno, NV) • **Jeanne R. Jones**: President and CEO, Alpha Services (Las Vegas, NV) • **John H.O. La Gatta**: President, Catamount Fund (Reno, NV) • **Dr. Kathleen Mahon, M.D.**: Mahon Eye Center and Chief of the Ophthalmology Division, University of Nevada School of Medicine (Las Vegas, NV) • **Dr. Raymond A. Nash, Jr.**: consultant (North Andover, MA) • **Robert L. Noland**: Myricom, Inc. (Carson City, NV) • **Richard S. Normington**: consultant and Professor of Business Management (Reno, NV) • **Dr. D. Warner North**: President and Principal Scientist, NorthWorks, Inc. (Belmont, CA); and Consulting Professor, Department of Management Sciences and Engineering, Stanford University (Stanford, CA) • **Edwin A. Ricks**: real estate developer and broker (Reno, NV) • **Sylvia Samano**: President, AT&T Nevada (Reno, NV) • **Thomas J. Schoeman, AIA**: President, JMA Architecture Studios (Las Vegas, NV) • **Vicki Hafen Scott**: owner, Hafen Financial Services (Henderson, NV) • **Jeff Shaw**: Chief Executive Officer, Southwest Gas Corporation (Las Vegas, NV) • **Stephen Snyder**: private sector development and consultant (Reno, NV) • **K. Anne Street**: President and CEO, Riverside Consulting Group (Alexandria, VA) • **Dr. Lee J. Suttner**: Emeritus Professor, Department of Geological Sciences, Indiana University (Bloomington, IN) • **Terry Van Noy**: principal, Van Noy Consulting Group (Henderson, NV) • **Troy Wade II**: Chairman, Nevada Alliance for Defense, Energy & Business (Las Vegas, NV)

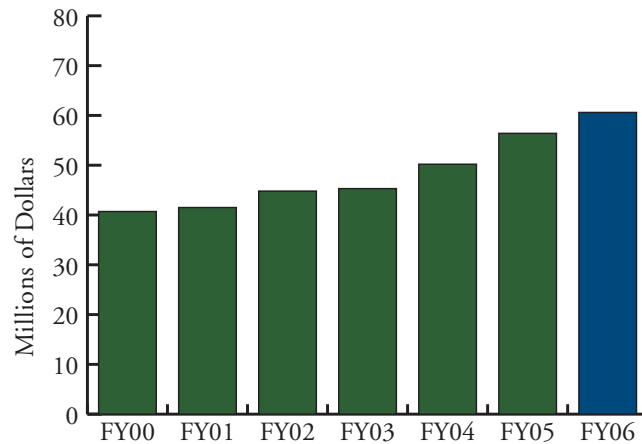
## Emeritus Trustees

**Dr. Arthur Anderson**: retired, IBM (Prescott, AZ) • **Hal Furman**: Chairman and Managing Director, The Furman Group, Inc. (Washington, DC) • **Sandy Miller**: former First Lady of the State of Nevada and educational leader (Las Vegas, NV) • **Howard Wahl**: retired, Bechtel Group, Inc. (Napa, CA)

*Officers, trustees, and titles as of June 30, 2006.*

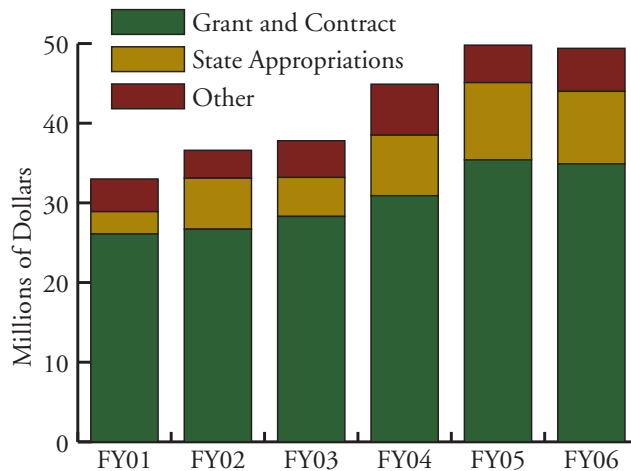


### Net Assets



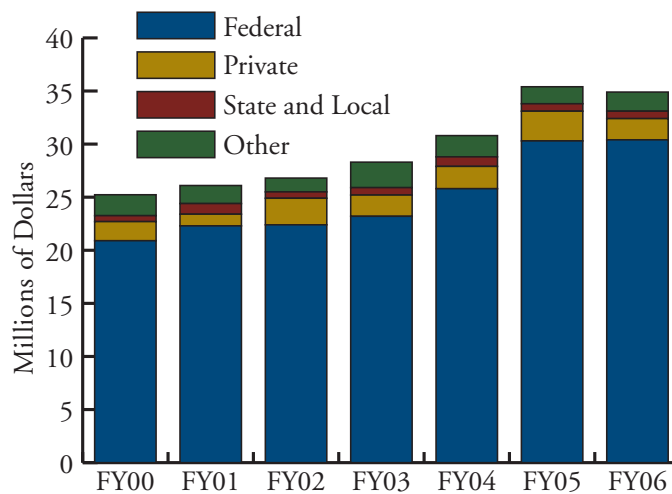
DRI's financial position at June 30, 2006, reflects assets of \$78.5 million and liabilities of \$17.9 million, with total net assets of \$60.6 million. This represents an increase in total net assets from FY 2001 of 46%. The increase is primarily due to increases in facilities and in laboratory and field research equipment.

### Total Revenue



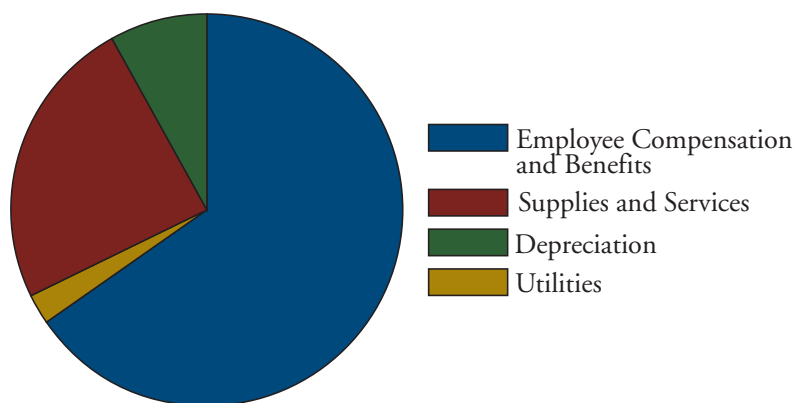
Since FY 2001, DRI's total revenues have increased by 49.4%, with the primary growth seen in grants and contracts.

### Grant and Contract Revenue by Source



Federal sources remain the largest component of grant and contract revenues.

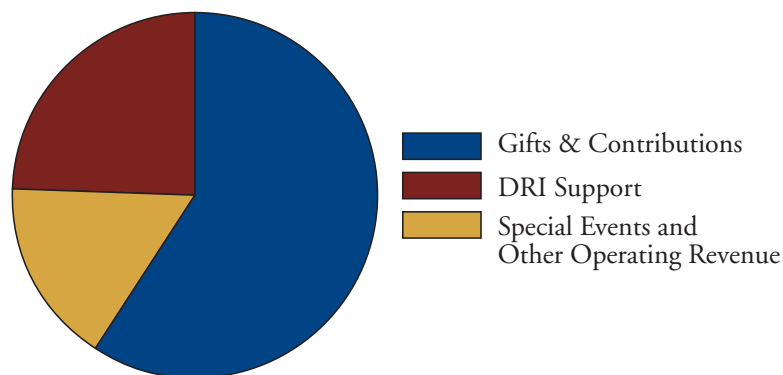
### Fiscal Year 2006 Operating Expenses



DRI's employees are the cornerstone of DRI's success, with employee compensation and benefits being the largest component of operating expenses.

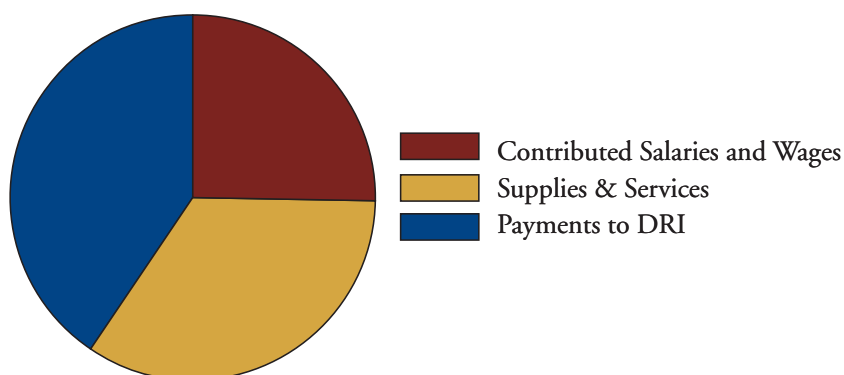
The DRI Research Foundation was established in 1983 to promote the immediate and long-term welfare of DRI by assisting in the development and acquisition of critical resources. The Foundation is governed by the Nevada System of Higher Education Board of Regents.

### *Total Revenue by Source*



For the year ending June 30, 2006, total revenue for the Foundation was approximately \$1,300,000.

### *Expenditures*



For the year ending June 30, 2006, over \$500,000 was given to DRI by the Foundation to support activities and programs.

For a copy of the audited financial statement, please call Kathy Badgett at 775.673.7480 or visit [www.dri.edu](http://www.dri.edu)



## *Board of Regents*

**Mr. Bret Whipple**, Chair  
**Mrs. Linda C. Howard**, Vice Chair  
**Mr. Mark Alden**  
**Dr. Stavros S. Anthony**  
**Dr. Jill Talbot Derby**  
**Mrs. Thalia M. Dondero**  
**Mrs. Dorothy S. Gallagher**  
**Dr. Jason Geddes**  
**Mr. James Dean Leavitt**  
**Mr. Howard Rosenberg**  
**Dr. Jack Lund Schofield**  
**Mr. Steve Sisolak**  
**Mr. Michael Wixom**

## *System Administration*

**Mr. James E. Rogers**, Chancellor

## *DRI Administration*

**Dr. Stephen G. Wells**, President  
**Dr. Roger L. Jacobson**, Vice President for Academic Affairs, Chief Officer for Faculty Relations  
**Dr. O. Cleve McDaniel**, Senior Vice President for Finance and Administration, Chief Operations Officer  
**Dr. Christopher Maples**, Executive Vice President for Research, Chief Science Officer  
**Dr. Claudia A. Miner**, Vice President for Institutional Advancement, Chief Officer for DRI Research Foundation  
**Mrs. Kathleen Badgett**, Assistant Vice President and Controller  
**Mr. Peter D. Ross**, Assistant Vice President of Campus Planning  
**Dr. S. Kent Hoekman**, Executive Director, Division of Atmospheric Sciences  
**Dr. Michael J. Auerbach**, Executive Director, Division of Earth and Ecosystem Sciences  
**Dr. John J. Warwick**, Executive Director, Division of Hydrologic Sciences  
**Dr. Nicholas Lancaster**, Senior Director, Center for Arid Lands Environmental Management  
**Dr. James Thomas**, Senior Director, Center for Watersheds and Environmental Sustainability  
**Dr. David S. Shafer**, Senior Director, Center for Environmental Remediation and Monitoring  
**Mr. William Sherman**, Director, Center for Advanced Visualization, Computation and Modeling  
**Dr. Mark C. Green**, Director, Cooperative Institute of Atmospheric Sciences and Terrestrial Applications  
**Greg Bortolin**, Acting Director of Government Relations  
**John Gardner II**, Deputy and Special Assistant to the President

*Positions and titles as of October 31, 2006*

### *DRI at a Glance*

Established by the Nevada Legislature in 1959; became a stand-alone NSHE institution in 1969

Nearly 500 researchers, staff, and students

Approximately 300 research projects per year

Research conducted in every state in nation and on every continent in world

Three research divisions: Hydrologic Sciences, Atmospheric Sciences, and Earth and Ecosystem Sciences

Four integrated science centers: Watersheds and Environmental Sustainability; Arid Lands Environmental Management; Environmental Remediation and Monitoring; and Advanced Visualization, Computation and Modeling

### *Campuses*

Reno campus on Dandini Research Park

Las Vegas campus on Southern Nevada Science Park

### *Satellite Research Facilities*

Solar One, Boulder City, Nevada

Storm Peak Laboratory, Steamboat Springs, Colorado

### *Financial Position Fiscal Year 2006*

\$78.5M in total assets; \$60.6M in net assets

85% growth in total annual revenues since 1999

Approximately 1% of NSHE budget directed to DRI; remainder primarily generated by competitive contracts and grants derived outside state

Since 1999, DRI has leveraged a total of \$60 million in state support to bring \$227 million in research funding to Nevada

Competitive growth in research portfolio since 2000:

NSF = 90%, EPA = 55%, Defense = 111%, Energy = 30%, Interior = 298%

### *Campus Life*

165 research faculty; no tenure, blend scientific achievement with entrepreneurialism

Stipends and fellowships for approximately 70 graduate students per year totaling more than \$1.7 million annually

DRI faculty provide value-added support to undergraduate and graduate teaching programs at UNR

Dr. John Hallett  
40 years  
Director Atmospheric  
Ice Lab

Dr. John Bowen  
35 years  
Associate Research  
Scientist

Dr. Steven Chai  
36 years  
Associate Research  
Professor

Dr. James "Jim"  
Hudson  
36 years  
Research Professor

Dr. Roger Jacobson  
31 years  
Vice President of  
Academic Affairs

Dr. William "Bill"  
Albright  
27 years  
Associate Research  
Hydrogeologist

James "Jim" Ashby  
25 years  
Climatologist

Dr. Alan Gertler  
28 years  
Research Professor

Edward Hackett  
25 years  
Senior Research  
Technologist

Marjory Jones  
26 years  
Special Program  
Administrator

Wallace "Alan"  
McKay  
28 years  
Associate Research  
Hydrogeologist

Mary Miller  
28 years  
Assistant Research  
Chemist

Debora "Debi" Noack  
27 years  
Electronic Publishing  
Technologist

Richard "Rick"  
Purcell  
28 years  
Associate Research  
Mechanical Engineer

Dr. Norman "Norm"  
Robinson  
27 years  
Associate Research  
Professor

Linda Piehl  
24 years  
Business Manager

Lycia Ronchetti  
22 years  
Business Manager

Nanette Merlino  
20 years  
Senior Executive  
Assistant to the  
President

Brenda Cristani  
20 years  
Laboratory  
Coordinator Data  
Analyst

Dr. Judith Chow  
21 years  
Research Professor

Dr. Darko Koracin  
20 years  
Research Professor

Dr. Richard Reinhardt  
21 years  
Director Western  
Regional Climate  
Center

Larry Sheetz  
23 years  
Principal Research  
Technologist

Dr. John Watson  
24 years  
Research Professor

Dr. Kendrick Taylor  
23 years  
Research Professor

Dr. Colleen Beck  
16 years  
Research Professor

Dr. Paul Buck  
15 years  
Associate Research  
Professor

Jeannette "Jenny"  
Chapman  
18 years  
Associate Research  
Hydrogeologist

William Coulombe  
19 years  
Associate Research  
Scientist

William "Bill" Dippel  
16 years  
Network Manager

Dr. Lynn  
Fenstermaker  
16 years  
Associate Research  
Professor

Sandra "Sandi"  
Gifford  
15 years  
Program Specialist

Dr. Mark Green  
16 years  
Research Professor

William "Ted"  
Hartwell  
15 years  
Associate Research  
Archaeologist

Ronald Hershey  
19 years  
Assistant Research  
Hydrogeologist

Barbara Hinsvark  
19 years  
Laboratory  
Coordinator

Arlen Huggins  
19 years  
Associate Research  
Scientist

Barbara Kennedy  
16 years  
Program Specialist/  
Financial Assistant

Dr. Nicholas Lancaster  
16 years  
Research Professor

Dr. Douglas  
Lowenthal  
17 years  
Associate Research  
Professor

Dorothy Miller  
19 years  
Database Manager

Timothy Minor  
15 years  
Associate Research  
GIS Remote Sensing  
Scientist

[www.dri.edu](http://www.dri.edu)

Dr. David Mitchell  
17 years  
Associate Research  
Professor

Dr. Steve Mizell  
19 years  
Associate Research  
Professor

Dr. Hans Moosmüller  
16 years  
Research Professor

Dr. David Mouat  
18 years  
Associate Research  
Professor

Todd Mihevc  
22 years  
Assistant Research  
Hydrogeologist

Stephanie Neal  
15 years  
Human Resources  
Payroll Benefits  
Specialist

Dr. Gregg Lamorey  
15 years  
Assistant Research  
Professor

Karl Pohlmann  
19 years  
Associate Research  
Hydrogeologist

Lyle Pritchett  
19 years  
Director of  
Information  
Technology

Dr. Kelly Redmond  
17 years  
Associate Research  
Professor

Dr. David Rhode  
17 years  
Research Professor

Jim Romaggi  
16 years  
Director of Budget  
and Analysis

Peter Ross  
16 years  
Assistant Vice  
President Campus  
Planning and Physical  
Plant

Amy Russell  
18 years  
Business Manager

Charles "Chuck"  
Russell  
19 years  
Associate Research  
Hydrogeologist

Kathleen  
Smith-Miller  
17 Years  
UNIX System  
Administrator

William "Mike"  
Walters  
15 years  
Building  
Technologist/  
Custodial Supervisor

Dr. Randolph  
"Randy" Borys  
20 years  
Associate Research  
Professor

Dr. Barbara Zielinska  
17 years  
Research Professor